

AMENDMENTS TO THE CLAIMS

1. (Previously Presented) Apparatus for compensating image signals produced by a CCD imager for smears, the CCD imager including an image area having a plurality of rows of pixels for accumulating charge during an image acquisition period, each row corresponding to a line of the image, an output register for receiving accumulated charge row by row during a transfer mode to produce line signals, at least one row of pixels being masked from incident radiation arranged on the side of the image area opposite the output register, and a multiplication register for multiplying charge produced by the CCD imager, the apparatus comprising:

an image data analyser for detecting the boundaries of a smear;

an image data replacer for replacing data between the boundaries of a detected smear with alternative image data, wherein the image data analyser is arranged to detect the boundaries of horizontal smears produced by incomplete charge transfer in the multiplication register; and

a subtractor for subtracting a signal corresponding to the charge accumulated during the transfer mode and transferred to the output register as lines corresponding to the at least one masked row, from the line signals corresponding to the rows of the image area.

2. (Original) Apparatus according to claim 1, wherein the image data analyser comprises means for detecting the boundaries of a smear by detecting rates of change in the image data greater than a predefined limit.

3. (Previously Presented) Apparatus according to claim 1, wherein the alternative image data is derived from image pixels neighbouring the detected smear.

4. (Previously Presented) Apparatus according to claim 1, wherein the alternative image data is derived by interpolation of image data.

5. (Previously Presented) Apparatus according to claim 2, wherein the image data analyser analyses the image line by line to detect intensity gradients greater than the predefined limit.

6. (Previously Presented) Apparatus according to claim 1, wherein the image data analyser comprises a kernel for analysing a portion of the image data at a time.
7. (Original) Apparatus according to claim 6, wherein the kernel has a sliding window to define the portion of the image being analysed by the kernel and moveable across the image to analyse the complete image.
8. (Previously Presented) Apparatus according to claim 1, comprising a temporal integrator for integrating at least two images acquired by the CCD imager prior to boundary detection by the image data analyser.
9. (Previously Presented) Apparatus according to claim 1, comprising a coordinate extractor for extracting the coordinates of the smear boundaries and providing the extracted coordinates to the image data replacer.
10. (Previously Presented) Apparatus according to claim 1, wherein the image data analyser detects the boundaries of vertical smears produced on transfer of image data from pixels of the CCD imager.
11. (Cancelled)
12. (Previously Presented) The combination according to claim 20, wherein the CCD imager further comprises a store arranged between the image area and the output register.
13. (Previously Presented) The combination according to claim 20, wherein the CCD sensor comprises a plurality of masked rows.

14. (Previously Presented) The combination according to claim 13, wherein a line signal is generated corresponding to each masked row and the error signal is generated from an average of the masked row line signals.
15. (Previously Presented) The combination according to claim 20, comprising a gain controller for varying the gain of the multiplication register for selected images or portions of images.
16. (Previously Presented) The combination according to claim 15, wherein the gain is adjusted to be relatively high and relatively low on alternate lines of the image.
17. (Previously Presented) The combination according to claim 16, wherein the gain is adjusted to be relatively high and relatively low on alternate images.
18. (Previously Presented) A CCD imaging apparatus comprising the apparatus according to claim 1.
19. (Previously Presented) A CCD camera comprising the CCD imager and the apparatus according to claim 20.
20. (Previously Presented) A combination comprising a CCD imager and an apparatus for compensating image signals produced by the CCD imager for smears, wherein:
the CCD imager comprises:
an image area having a plurality of rows of pixels for accumulating charge during an image acquisition period, each row corresponding to a line of the image;
an output register for receiving accumulated charge row by row during a transfer mode to produce line signals, at least one row of pixels being masked from incident radiation arranged on the side of the image area opposite the output register; and
a multiplication register for multiplying charge produced by the CCD imager; and

the apparatus comprises:

an image data analyser for detecting the boundaries of a smear;

an image data replacer for replacing data between the boundaries of a detected smear with alternative image data, wherein the image data analyser is arranged to detect the boundaries of horizontal smears produced by incomplete charge transfer in the multiplication register; and

a subtractor for subtracting a signal corresponding to the charge accumulated during the transfer mode and transferred to the output register as lines corresponding to the at least one masked row, from the line signals corresponding to the rows of the image area.